

**Response to Comments on
EPA's Technical Review of the April 2018 Progress Report for the
Former United Shoe Machinery Division North Parcel**

Please note that these comments are being prepared for informational purposes only. EPA will have a conference call to discuss any of these comments but is not expecting further responses. The comments should be addressed appropriately in subsequent submittals.

EPA Comment: In the summary tables, figure 3, or both, samples S-135C.1 and S-135C.3 are reversed. Canister S-135.C3 did not collect a full sample ("hold" was noted in the field log) and was located on figure 3 as S-135C.3. The location S-135C.3 was where the duplicate samples were collected (large open room with two desks back to back in the middle of the room). All of the laboratory results, summary tables, notes and figure need to be reviewed again.

Response: *The issues raised in this comment primarily involve possible errors with sample identifications in the figures. Field notes will be reviewed and changes to the figures will be made consistent with EPA's comment. The Progress Report noted field issues with canister S-135.C3; the sample collected was analyzed. The April Progress Report remarked:*
"Of note in the April 2018 sampling event, there were two indoor air samples identified as having possible canister issues. Sample S-135C.3 had an ending canister negative pressure of 22.4 inches mercury indicating a possible air regulator malfunction resulting in a reduced sample collection volume. Sample S-149J.2 had a final canister pressure on the chain of custody of -12.35 inches of mercury, but had a final pressure measured upon receipt in the laboratory of -1.6 inches of mercury; this indicates an error on the chain of custody or a leak in the canister (likely occurring during removal of the air regulator). So while the results of both of those samples could be considered "suspect", their results compared to their respective comparable samples from January and April 2018 were very consistent and do not indicate the presence of significant error due to potential equipment malfunctions."
Further review of all summary tables, notes, laboratory results, etc. is not necessary at this time.

EPA 2nd Comment dated 6/20/18

This comment has not been addressed. The data should be presented to the suite managers/parents with correct summary tables and figures. Verification of the summary tables, notes and laboratory results would be appropriate now.

The field issues with the two canisters likely indicate that these results are suspect and should not be used in a qualitative risk assessment because you don't know how long the sample was collected for/volume of the sample collected.

EPA Comment: All of the figures need north arrows and need to be shown as insets with proper orientation on a full figure of the site.

Response: *In future reports, the figures will be revised consistent with EPA's comment*

EPA 2nd Comment dated 6/20/18

No further comment.

EPA Comment: The location of the play yard for bright horizons needs to be shown on the figure and the location of the outdoor air sample needs to be shown in the play yard. The location of S-157J.3 as shown on figure 7 is incorrect (not in the correct room).

Response: *The figures will be revised consistent with EPA's comment.*

EPA 2nd Comment dated 6/20/18

No further comment.

EPA Comment: The indoor air samples were proposed to be collected adjacent to soil gas samples. Please clarify why this was not done at all locations. A direct comparison of each indoor air sample and the nearest sub-slab soil gas sample needs to be made in shown in the summary tables (no averages and no ranges should be used). It's not appropriate to simply draw the conclusion that VI is not occurring without providing some supporting evaluation and presentation of the data.

Response: *EPA's comment regarding proposed sample locations is not quite accurate. Respondents have communicated with EPA multiple times regarding sample locations, and the locations used were entirely consistent with those communications. The September 2017 Written Proposal showed the approximate locations of soil gas samples and indoor samples in Buildings 100, 500, and 600 in Figures 5, 6, 7, 8, and 9. EPA approved this proposal. Actual sample locations were also shown in the figures accompanying the numerous monthly Progress Reports. In some cases, indoor air sample locations were co-located with soil gas points; in others, they were not. In each case, however, the sample locations were provided to and approved by EPA.*

EPA 2nd Comment dated 6/20/18

Where samples are co-located, the requested evaluation should be completed. In addition, the other lines of evidence as listed by MassDEP in the conference call on 6/19/18 should also be included.

EPA also states that "a direct comparison of each indoor air sample and the nearest sub-slab soil gas sample needs to be made [and] shown in the summary tables." Respondents respectfully disagree. The intent of the vapor intrusion sampling, as stated in the September 2017 Written Proposal (and approved by EPA), is for each building space to be evaluated separately (i.e., Building 100 S-135, Building 100 S-149J, Building 100 S-157J, Building 500 S-100, and Building 600 S-171X) to determine if significant vapor intrusion is occurring in each space and to establish exposure point concentrations (EPCs) for risk assessment. As such, the standard protocol is to look at all the indoor air and soil gas data in each space, and not at individual points within a space separately (unless a specific point differs significantly in results from other points in the same space).

EPA 2nd Comment dated 6/20/18

EPA has no objection to each building space/suite being evaluated separately. The objection is the use of the phrase "determine if significant vapor intrusion is occurring." Part of the objective is to determine if vapor intrusion is occurring (i.e., is there a complete pathway).

Justification should be provided for eliminating sampling results from the evaluation. An elevated concentration does not justify elimination of a result from a risk assessment.

[Reference 1; Section 2.2.8] For EPC development, the maximum concentration of each detected contaminant is then used, regardless of the location within the space or the season in which the sample was collected. To evaluate whether significant vapor intrusion is occurring, various ranges of detections in the soil gas and indoor air samples are used to determine – within each space – if indoor air and/or soil gas concentrations are consistent or if concentrations are significantly higher for one or more samples than the other sample locations. Risk assessment (either quantitative or screening) is also used to establish which contaminants would be considered significant if vapor intrusion were occurring.

EPA 2nd Comment dated 6/20/18

The above disagreement appears to stem from the two tasks at hand. (1) is to evaluate using multiple lines of evidence, if vapor intrusion is occurring. The other is to perform a risk assessment to determine the significance.

Just to clarify, the Written Proposal does not state that the intent of the vapor intrusion sampling is “to determine if significant vapor intrusion is occurring in each space”. However, it does state the following:

- "EPA requires further examination to determine: whether vapor intrusion is occurring at the locations identified by EPA, including but not limited to, buildings 100, 500, and 600";
- "In accordance with the ACO requirements, additional evaluation of vapor intrusion will be performed", and;
- "Additional sampling assessment of this pathway will conform to the applicable protocols of both the June 2015, U.S. EPA OSWER Technical Guide for Assessing and Mitigating The Vapor Intrusion Pathway From Subsurface Vapor Sources To Indoor Air and the MassDEP October 2016 Vapor Intrusion Guidance Policy #WSC 16-435."

Ultimately, it's the MCP and MassDEP and/or EPA vapor intrusion guidance that govern the data evaluation and risk assessment.

- The Written Proposal also states in Section **8.0 RISK ASSESSMENT AND ENVIRONMENTAL INDICATORS ANALYSIS, 8.1 Risk Assessment**
“After the completion of sampling events for each specific investigation, a risk characterization will be performed as needed using the laboratory analysis data. The risk assessment will be in accordance with the necessary provisions of the MCP (310 CMR 40.0900) and currently accepted standards for assessments of this nature using Method 3 risk assessment protocols. Each indoor sampling building location will be evaluated separately as its own exposure point using the protocols for unrestricted use (i.e., residential or child day care). **All detected compounds in the indoor air samples will be initially carried throughout the risk assessment to determine the most conservative total Site risk;** however compounds may be removed from the assessment if their detection is shown not to be due to vapor intrusion. Exposure point concentrations for each compound shall be based on the maximum detected concentrations between the various seasonal sampling events. For each individual compound, the carcinogenic and noncancer risks will be determined using the most current information available from the risk characterization databases available from the EPA and/or the MassDEP. Initial risk-based target levels are based on carcinogenic and noncancer risks (where available) for each compound from the EPA Regional Screening Level Resident Air Supporting Table (May 2016) and the MassDEP Final Vapor Intrusion Guidance, MassDEP Policy WSC# 16-435, October 2016. Compounds that have

available noncancer information but do not have carcinogenic information will be presumed to have been previously established as noncarcinogenic compounds. A compound that has no existing available information as to carcinogenic or noncancer risks will be evaluated the same as a similar compound that has available information (e.g., 1,3,5-trimethylbenzene shall be evaluated as 1,2,4-trimethylbenzene) unless it is considered to be prevalent in the environment, in which case said compound will not be carried throughout the risk characterization (e.g., ethanol and ethyl acetate). Exposure factors to be used will be those created by MassDEP in the MCP Method 3 Risk Assessment for Residents Exposed to Chemicals in Indoor Air Shortform (i.e., residential exposures will be evaluated assuming an exposure period of 24 hours per day, 365 days per year). Carcinogenic risks will be calculated for the young child (ages 1-7) and the child/adult (ages 8-30). Noncancer risks will be calculated for the young child (ages 1-7). The individual carcinogenic and noncancer risks for all compounds in each sampling location will be summed into a total risk for that particular location. It is important to remember that the total Site risk may be greater than the actual indoor air risk due to vapor intrusion of compounds from historic Site operations. Therefore, in the uncertainties portion of the risk assessment, the risk assessment results will be refined to present the portion of total Site risk that could be due to vapor intrusion from compounds used in the former Site operations. Compounds present in indoor air samples that were not present in soil gas data or were detected at concentrations significantly greater than those in soil gas will be eliminated as vapor intrusion contaminants of concern (unless they represent degradation products of compounds historically detected) as they will be assumed to be unrelated to potential volatile compounds that may be present underneath the buildings due to historic Site operations. Compounds that are detected in the outdoor sample locations at greater concentrations than the indoor air sampling locations will also be eliminated as vapor intrusion contaminants of concern. Additional quantitative human health risk assessment (outside the vapor intrusion assessment) is not likely to be necessary. **The Site Activity and Use Limitation prevents direct contact with the soil (even in the residential and child daycare areas).** Area groundwater is not considered to be drinking water. Therefore, there are no complete human exposure pathways other than potential vapor intrusion.”

Regarding the bold text above we offer the following to clarify and avoid further delays due to ambiguities

- 1) All detected compounds in the indoor air samples need to be initially carried through the risk assessment to determine the most conservative total site risk.
- 2) Although the AUL is intended to prevent direct contact with soil in the school/daycare playgrounds, the risk assessment should evaluate total site risk without controls in place.

Respondents agree with EPA’s statement that “[i]t’s not appropriate to simply draw the conclusion that VI is not occurring without providing some supporting evaluation and presentation of the data.” However, Section 4 of the April Progress Report did provide such data evaluation. While the Progress Report did not contain the level of detail that one might see in a RFI report, it is plain from the data presented in the tables to the April Progress Report that significant vapor intrusion does not appear to be occurring.

EPA 2nd Comment dated 6/20/18

Dismissing that the vapor intrusion pathway exists based on using ranges as completed in the January 2018 Progress Report (dated February 2018), is not appropriate and is not in accordance with either cited vapor intrusion guidance.

The only groundwater well with significant VOCs present was FSL-7 (with cis-1,2-dichloroethene, ethylbenzene, xylenes, and C9-C12 aliphatic petroleum hydrocarbons). The building closest to well FSL-7 is Building 600, and none of the foregoing compounds was detected above the residential screening values in either soil gas or indoor air at such building. The only soil gas samples that exceeded residential screening values were all collected in January 2018 and similar exceedances were not replicated in the April 2018 sampling event (TCE for a single sample in Building 100 S-135C, naphthalene for a single (duplicate) sample in Elliott Landing, and a single sample in Building 100 S-157J). With indoor air, the concentration of TCE in Building 100 S-135C did not exceed residential screening values, and the naphthalene in indoor air samples in Building 100 S-157J were only slightly higher than the soil gas concentrations.

Based on MassDEP's 2016 vapor intrusion guidance policy (which, according to the September 2017 Written Proposal that was approved by EPA, controls here), significant vapor intrusion is not expected to be present when groundwater wells have insignificant VOCs present (below MCP Method 1 GW-2 standards) and soil gas values do not exceed screening thresholds. [Reference 1; Section 2.2.8, Table 2-2].

EPA 2nd Comment dated 6/20/18

The fact that groundwater had insignificant VOCs present does not rule out the potential for (1) a contaminant source in soils or (2) that wells are not properly placed (horizontally and/or vertically) to intercept impacted groundwater.

Table 2-2 above is to be used once a vapor intrusion pathway has been identified. The April 2018 Progress Report stated that "Based on both the January 2018 and April 2018 sampling rounds, the overall initial conclusion is that there is no evidence of vapor intrusion at the Site."

The indoor air results reveal a limited number of contaminants which exceeded the residential screening standards: 1,2-dichloroethane (five locations), benzene (five locations), 2-butanone (Building 500 S-1100 only), bromodichloromethane (Building 500 S-1100 and Building 600 S-171X only), carbon tetrachloride (five locations and outdoor samples), chloroform (five locations), isopropyl alcohol (Building 100 S-135C, Building 100 S-149J, Building 100 S-157J, and Building 500 S-1100 only), naphthalene (five locations and outdoor samples), methylene chloride (Building 100 S-149J only), styrene (Building 100 S-135C only), C5-C8 aliphatic petroleum hydrocarbons (Building 100 S-135C, Building 100 S-157J, and Building 500 S-1100 only), and C9-C12 aliphatic petroleum hydrocarbons (Building 100 S-135C and Building 500 S-1100 only). For an individual evaluation on each contaminant:

1,2-Dichloroethane: Compound not detected in soil gas at Building 100 S-157J or Building 600 S-171X, but detected in indoor air at significantly greater concentrations (order of magnitude) than soil gas at Building 100 S-149J and Building 500 S-1100. Concentrations were within the same order of magnitude between indoor air and soil gas at Building 100 S-135C. These are all indications that no significant vapor intrusion is occurring.

Benzene: Concentrations were within the same order of magnitude between indoor air and soil gas in all spaces. This is an indication that no significant vapor intrusion is occurring.

2-Butanone: Compound detected in indoor air at significantly greater concentrations (order of magnitude) than soil gas at Building 500 S-1100. This is an indication that no significant vapor intrusion is occurring.

Bromodichloromethane: Concentrations (when detected) were within the same order of magnitude between indoor air and soil gas at Building 100 S-135C and Building 600 S-171X. This is an indication that no significant vapor intrusion is occurring.

Carbon Tetrachloride: The levels detected in five interior locations were comparable to the concentrations found in the outdoor samples. This is a clear indication that the presence of this contaminant is due to the exterior air and not to vapor intrusion.

Chloroform: The levels detected in five interior locations were comparable to the concentrations found in the outdoor samples. This is a clear indication that the presence of this contaminant is due to the exterior air and not vapor intrusion.

Isopropyl alcohol: Compound detected in indoor air at significantly greater (order of magnitude) concentrations than soil gas in all spaces where detected. This is an indication that no significant vapor intrusion is occurring.

Methylene Chloride: Compound not detected in soil gas at Building 100 S-149J, except for one soil gas sample (whose concentration was comparable to the indoor air concentrations). This is an indication that no significant vapor intrusion is occurring.

Naphthalene: Compound detected in indoor air at significantly greater concentrations (order of magnitude) than soil gas at Building 100 S-135C. Concentrations were within the same order of magnitude among indoor air, outdoor samples, and soil gas at the other four spaces. These are all indications that no significant vapor intrusion is occurring.

Styrene: Concentrations were within the same order of magnitude between indoor air and soil gas in Building 100 S-135C. This is an indication of a lack of significant vapor intrusion.
C5-C8 aliphatic petroleum hydrocarbons: Concentrations were within the same order of magnitude between indoor air and soil gas in Building 100 S-135C, Building 100 S-157J, and Building 500 S-1100, with the exception of single soil gas points in Building 100 S-157J and Building 500 S-1100 which had higher concentrations. The single point in Building 500 S-1100 with elevated concentrations was collected in January 2018 and the elevated concentration was not replicated in April 2018. Also, the indoor air concentrations for this compound were consistent in all locations in this space in both January and April 2018. These are all indications that no significant vapor intrusion is occurring.

C9-C12 aliphatic petroleum hydrocarbons: Concentrations were within the same order of magnitude between indoor air and soil gas in Building 100 S-135C and Building 500 S-1100. This is an indication that no significant vapor intrusion is occurring.

EPA Comment: Please provide a detailed reference for the assumption that indoor air sample concentration should be an order of magnitude less than an adjacent slab-soil gas concentration to indicate vapor intrusion is occurring.

Response: *This assumption is based on the concept of a sub-slab soil gas-to-indoor air dilution factor. The MassDEP vapor intrusion guidance policy uses an air dilution factor of 70. This generic dilution factor corresponds to the inverse of the 80th percentile of the sub-slab soil gas attenuation factors in the USEPA OSWER's 2008 vapor intrusion database. EPA VISL 2014 uses a dilution factor of 33.33 (attenuation factor of 0.03). Other EPA documents refer to a more conservative attenuation factor of 0.1 (dilution factor of 10). Even using the most conservative dilution factor, the difference between soil gas and indoor air still amounts to an order of magnitude. According to the EPA and DEP guidance, an indication that vapor intrusion may be occurring arises, in the **absence of a preferential flow pathway**, when soil gas concentrations are at least an order of magnitude in concentration greater than indoor air concentrations. [References 1, 2, and 3]*

EPA 2nd Comment dated 6/20/18

The information submitted to date has not provided any discussion or documentation that any evaluation of preferential pathways has taken place. Modeling indoor air concentration from soil gas data includes a dilution factor but due to the shallow nature of the groundwater at the site, modeling is not likely appropriate at this site.

REFERENCES

1. MassDEP Policy WSC-16-435, Vapor Intrusion Guidance, October 2016.

2. Brewer, R., J. Nagashima, M. Rigby, M. Schmidt, and H. O'Neill. (2014). *Estimation of Generic Subslab Attenuation Factors for Vapor Intrusion Investigations*. *Groundwater Monitoring & Remediation* 34(4):79–92.

3. EPA. 2015. *OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Sources To Indoor Air* (OSWER Publication 9200.2-154). Office of Solid Waste and Emergency Response.